



BIOSENSE

User Guide

VERSION 2.0

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Introduction

Background

BioSense is an early event detection and situational awareness system developed to provide state and local public health officials access to health data collected from within their jurisdictions. It strives to provide public health officials with a real-time sense of their community's health status and to support early and effective public health response. BioSense's approach to infectious disease surveillance does not rely upon mandatory or voluntary case reports from healthcare providers to public health officials. Instead, BioSense accesses and analyzes data generated in the course of individuals' interactions with healthcare providers and other health-related services. BioSense summarizes and presents data by source, day, zip code, and syndrome through several views including maps, graphs, and tables. BioSense views can be customized to analyze information for patterns and potential outbreaks. BioSense may facilitate detection and characterization of public health events and provide a valuable adjunct to epidemiologic response, consequence management, and recovery operations.

Access

The Centers for Disease Control and Prevention (CDC) is authorized by the Public Health Service Act (42 U.S.C. 241, 317 and 319A) to maintain active surveillance of diseases through epidemiologic and laboratory investigations and data collection, analysis, and distribution. If the data source is a covered entity under the Health Insurance Portability and Accountability Act and the data provided is identifiable, this disclosure is permissible as a disclosure to a public health authority authorized by 45 CFR 164.512(b). Data provided to CDC under this agreement is in accordance with applicable data rights and related agreements.

CDC is able to provide secure transmission of data using Secure Data Network (SDN) and Public Key Infrastructure (PKI) technology. The SDN ensures that the parties to any sensitive electronic transaction are who they claim to be, supports bilateral authentication in which both users and programs can be certain that they are connected to or communicating with the correct uniquely identified individual or entity, and provides for multi-step electronic trust relations supported by industry-standard Certificate Authority services. A PKI implementation is a combination of technology, policies, and procedures that support digital signatures, encryption, and other inherent PKI-enabled security services.

Designated BioSense Administrators authorize access to BioSense for each public health jurisdiction. Upon their approval, an approved SDN digital certificate is required, and a login is established authorizing access to data pertaining to that jurisdiction. Zip codes are the basic geographic unit within BioSense, and jurisdictions (states and metropolitan areas) are defined in terms of a set of zip codes.

All users must accept the BioSense Data Access, Use, and Sharing Agreement provided each time the application is accessed. This serves as verification of a grant of authority from CDC for the recipient to conduct the public health activities described within the agreement acting as a public health authority pursuant to the Standards for Privacy of Individually Identifiable Health Information promulgated under the Health Insurance Portability and Accountability Act (HIPAA) (45 CFR Parts 160 and 164). Upon successful login and acceptance of the Data Use Agreement, you will enter the BioSense application.

BioSense Website

Information regarding BioSense is available online at: <http://www.cdc.gov/phn/component-initiatives/biosense/index.html>

User Guide

To print the BioSense User Guide in its entirety:

1. Navigate to the Introduction book in the BioSense online help.
2. Click the Printing the BioSense User Guide topic.

(IMPORTANT: The BioSense User Guide will print using Adobe Acrobat. For further printing instructions, see the Acrobat Online Guide available in Acrobat's online help.)

3. To open the BioSense User Guide (in .pdf format), click the hyperlinked document name.

BioSense Data Sources

Overview

The Centers for Disease Control and Prevention (CDC) has agreements with several data providers establishing basic terms and conditions for sharing, protection, and use of certain health-related data for public health surveillance designed to assist in the possible detection of bioterrorism and other public health threats and problems as may be determined.

For decades, the CDC has been collecting a wide range of national health-related data in the areas of public health surveillance, analysis, and response to carry out its public health mission. Typically, these data have been provided to CDC from state and local health agencies that in turn obtain the data from a variety of healthcare provider sources in their respective jurisdictions. However, the current elevated concern over potential bioterrorism in the U.S. warrants nontraditional approaches to public health surveillance to obtain new types and sources of relevant data, to substantially reduce the latency of information flow, to increase completeness and accuracy, and to improve national coverage.

BioSense currently has three data provider implementations: Department of Defense (DoD) Medical Treatment Facilities (MTFs), Veterans Administration (VA) treatment facilities, and Laboratory Corporation of America (LabCorp) test orders. BioSense no longer receives data from over-the-counter (OTC) retail drug providers.

Department of Defense

DoD MTFs provide electronic ambulatory care records indicating treatment for military personnel and dependants. Records can contain multiple diagnosis codes (ICD-9-CM) and procedure (CPT) codes per visit. ICD-9-CM and CPT codes are stored in the DoD's ambulatory care TRICARE information system. DoD data is extracted from the TRICARE system and transmitted daily to BioSense. It may take several days for the records from all facilities to be transmitted to BioSense. Codes (ICD-9 and CPT) are each mapped to a syndrome, but only one count per syndrome is generated per visit. For example, if three procedures were performed, but two are mapped to the same syndrome, then there will be only one count for each of the two syndromes for that visit. The zip code for data analysis and visualization is the MTF zip code.

Department of Veterans' Affairs

The Department of Veterans' Affairs (VA) facilities include 172 hospitals and more than 650 outpatient clinics nationwide and use electronic ambulatory care records that include diagnosis codes (ICD-9-CM) and procedure (CPT) codes for each visit. These data are transmitted daily from the VA data center in Austin, TX, to BioSense. Codes (ICD-9 and CPT) are each mapped to a syndrome; however, only one count per syndrome is generated per visit. For example, if three procedures were performed and two are mapped to the same syndrome, then there will be only one count for each of the two syndromes for that visit. The zip code for data analysis and visualization is the patient residence zip code.

Laboratory Corporation of America

Laboratory Corporation of America (LabCorp) operates a nationwide network of 31 primary testing locations and more than 1,100 patient service centers, and it tests more than 340,000 specimens daily. BioSense receives daily transmission of selected Health Level 7 (HL7) lab orders from LabCorp. Data files are sent to CDC daily using the Public Health Information Network Messaging System (PHINMS) with digital certificates and encryption. BioSense currently has LabCorp test

order data dating back to December 2003. LabCorp data include patient age, gender, zip code, order date, facility, facility zip code, lab order local codes, Logical Observation Identifiers names and Codes (LOINC) codes, and ICD-9-CM codes associated with the lab test order(s). CDC does not receive results associated with each lab order. The zip code for data analysis and visualization is the patient zip code; if the patient zip code is not included in the record, the facility zip code or test provider zip code is used.

Over-the-counter Drug Sales

CDC no longer receives daily data from 10,000 commercial pharmacies representing approximately 30% of the total United States OTC drug market. However, historical OTC data remains available in the application. Pharmacies from all 50 states and several foreign countries had reported sales data for various OTC drug products. These data were collected at the individual pharmacy level and then transmitted on a daily basis to a central data facility for each retailer. At the central data facility, Universal Product Codes (UPC) codes for select OTC products were grouped into several syndrome categories and aggregated by pharmacy zip code. These counts by zip code represent the data transmitted to the CDC.

Syndrome Mappings

Overview

Data in the BioSense application are organized into 11 syndromes:

- Botulism-like
- Fever
- Gastrointestinal
- Hemorrhagic Illness
- Localized Cutaneous Lesion
- Lymphadenitis
- Neurological
- Rash
- Respiratory
- Severe Illness/Death
- Specific Infection

Descriptions of these syndrome categories can be found on the CDC website

<http://www.bt.cdc.gov/surveillance/syndromedef/index.asp>

The Specific Infection category is intended to represent specific illnesses. In the example of ICD9 codes, Specific Infection contains all category 3 codes, while the category 1 and category 2 codes are placed into their respective syndromes.

ICD-9-CM Codes

To support several enhanced syndromic surveillance activities associated with high-profile community events, the CDC has identified syndrome categories to be monitored that are indicative of the clinical presentations of several critical bioterrorism-associated conditions. The DoD ESSENCE program also developed broad syndrome groups using ICD-9-CM codes that approximate natural infectious disease outbreaks or bioterrorism. These syndrome groups are currently under routine surveillance at military medical treatment facilities. Other public health agencies have also developed syndrome-based definitions and code groupings specific to their data sources and surveillance goals. By combining experiences, DoD, CDC, and other investigators have developed a suggested list of syndrome groups, definitions, and corresponding ICD-9-CM codes that can be used in syndromic surveillance programs.

A multi-agency working group was established to identify and define candidate syndrome groups. Eleven syndromes and corresponding code sets were selected based on a systematic selection process, and definitions for each syndrome group were created by consensus. Individual ICD-9-CM codes were selected as candidates for inclusion in defined syndrome groups after an exhaustive search through all possible codes. Codes have been divided into three categories based on overall association with a syndrome or with a specific disease and by observed frequency of code usage in three clinical data sources (representing discharge diagnoses for outpatient visits and emergency department visits). The following categories within syndrome groups were defined:

- **Category 1** – Codes that reflect general symptoms of the syndrome group including codes for bioterrorism diseases of highest concern or diseases highly approximating them.
- **Category 2** – Codes that might normally be placed in the syndrome group, but for which daily volume could overwhelm or otherwise detract from the signal generated from the Category 1 code set.
- **Category 3** – Specific diagnoses that fit into the syndrome category but that occur infrequently or have very few counts. These codes may be excluded to simplify syndrome category code sets.

The working group, using two large medical data sets (DoD outpatient visits and civilian emergency department visits), also assesses trends over time, frequency of code use, and subsequent contribution of selected codes to background ‘noise’ of the ICD-9-CM-coded syndrome groups. This analysis is ongoing but emphasized the need to evaluate the performance of the code sets in each data source.

The resultant working set can be found at
<http://www.bt.cdc.gov/surveillance/syndromedef/index.asp>

CPT Codes

Based upon the syndrome definitions created by the working group, the CPT procedure codes were mapped to syndromes as listed in Table 1.

Table 1. CPT Procedure Codes Mapping

CPT	Description	Resp	Fever	Lymph	Neuro	GI	Spec Inf
71010	Radiologic examination, chest; single view, frontal	X					
71015	Radiologic examination, chest; stereo, frontal	X					
71020	Radiologic examination, mastoids; less than three views per side	X					
71021	Radiologic examination, chest, two views, frontal and lateral; with apical lordotic procedure	X					
71022	Radiologic examination, chest, two views, frontal and lateral; with oblique projections	X					
71023	Radiologic examination, chest, two views, frontal and lateral; with fluoroscopy	X					
71030	Radiologic examination, mastoids; complete, minimum of three views per side	X					
71034	Radiologic examination, chest, complete, minimum of four views; with fluoroscopy	X					
71035	Radiologic examination, chest, special views (e.g., lateral decubitus, Bucky studies)	X					
85004	Blood count; automated differential WBC count		X	X			
85007	Blood count; blood smear, microscopic examination with manual differential WBC count		X	X			

CPT	Description	Resp	Fever	Lymph	Neuro	GI	Spec Inf
85008	Blood count; blood smear, microscopic examination without manual differential WBC count		X	X			
85009	Blood count; manual differential WBC count, buffy coat		X	X			
85032	Blood count; manual cell count (erythrocyte, leukocyte, or platelet) each		X	X			
85048	Blood count; leukocyte (WBC), automated		X	X			
87040	Culture, bacterial; blood, aerobic, with isolation and presumptive identification of isolates (includes anaerobic culture, if appropriate)		X	X			X
87045	Culture, bacterial; stool, aerobic, with isolation and preliminary examination (e.g., KIA, LIA), Salmonella and Shigella species					X	
87046	Culture, bacterial; stool, aerobic, additional pathogens, isolation and presumptive identification of isolates					X	
87070	Culture, bacterial; any other source except urine, blood or stool, aerobic, with isolation and presumptive identification of isolates				X		
87075	Culture, bacterial; any source, except blood, anaerobic with isolation and presumptive identification of isolates				X		
87076	Culture, bacterial; anaerobic isolate, additional methods required for definitive identification, each isolate				X		
87077	Culture, bacterial; aerobic isolate, additional methods required for definitive identification, each isolate				X		
87081	Culture, presumptive, pathogenic organisms, screening only;				X		

CPT	Description	Resp	Fever	Lymph	Neuro	GI	Spec Inf
87084	Culture, presumptive, pathogenic organisms, screening only; with colony estimation from density chart				X		
89055	Leukocyte assessment, fecal, qualitative or semiquantitative					X	
89350	Sputum, obtaining specimen, aerosol induced technique (separate procedure)	X					

LabCorp Test Codes

A working group of experts participated in mapping lab order codes to the syndrome groups included in the BioSense system (Table 2). Experts mapped each lab order to one or more syndromes. Mapping results were reviewed to be consistent within the same LabCorp lab order panel or profile group (e.g., different components in the Hepatitis profile were mapped in the same way). In addition, the mapping results were planned be consistent with LabCorp's documentation of test use and specimen (e.g., some pathogens could appear in multiple organ systems; if the specimen was specified as "stool," it was mapped to the gastrointestinal syndrome group). Lab order code taxonomy was created to classify lab order codes; the lab order codes classified in the same disease or pathogen group were mapped in the same way. Some lab order codes were mapped to more than one syndrome group.

Table 2. BioSense LabCorp Test Order Mapping to Syndromes

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
008649	Aerobic Bacterial Culture	1	0	0	0	0	0	0	0
008904	Anaerobic Culture	1	0	0	0	0	0	0	0
008003	Anaerobic and Aerobic Culture	1	0	0	0	0	0	0	0
008300	Blood Culture, Routine	1	0	0	0	0	0	0	0
008573	Viral Culture, General	1	0	0	0	0	0	0	0
183111	Anaerobic/Aerobic/Gram's Stain	1	0	0	0	0	0	0	0
138552	Febrile Agglutinin Panel	1	0	0	0	0	0	0	0
015271	Lyme Ab/Total Immunoglobulins	0	0	0	0	1	1	0	0
161653	LYME/SYPHILIS AB DIFF PROFILE	0	0	0	0	1	1	0	0
223586	Lyme Ab, Total/IgM Responses	0	0	0	0	1	1	0	0
258004	Lyme Ab/Western Blot Reflex	0	0	0	0	1	1	0	0
138685	Lyme Disease(B.Burgdorferi)PCR	0	0	0	0	1	1	0	0
550012	Lyme PCR, Borrelia burgdorferi	0	0	0	0	1	1	0	0
160333	Lyme, IgM, Early Test/Reflex	0	0	0	0	1	1	0	0
160325	Lyme, Total Ab Test/Reflex	0	0	0	0	1	1	0	0
163600	Lyme, Western Blot, Serum	0	0	0	0	1	1	0	0
162263	Lyme, Western Blot, Syn Fluid	0	0	0	0	1	1	0	0
008185	Malarial Smear	1	0	0	0	0	0	0	0
164722	Ehrlichia Ab Panel	1	0	0	0	0	0	0	0

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
164763	Human Gran. Ehrlichiosis (IgG)	1	0	0	0	0	0	0	0
138168	Human Monocytic Ehrlich-PCR	1	0	0	0	0	0	0	0
164680	E. chaffeensis-HME (Monocytic)	1	0	0	0	0	0	0	0
138412	Ehrlichia Detection by PCR	1	0	0	0	0	0	0	0
164672	Human Granulocytic Ehrlich-HGE	1	0	0	0	0	0	0	0
008540	Gram's Stain	1	0	0	0	0	0	0	0
182261	Aerobe ID & Suscept	1	0	0	0	0	0	0	0
182345	Anaerobe Identification Only	1	0	0	0	0	0	0	0
183129	MRSA Culture Only	1	0	0	0	0	0	0	0
182253	MRSA Culture/Susceptibility	1	0	0	0	0	0	0	0
182360	Vancomycin-Resist Enterococcus	1	0	0	0	0	0	0	0
008870	MIC/Min Bactericidal Conc	1	0	0	0	0	0	0	0
182675	AFB Cult/Smear, Broth, Suscep	1	0	0	0	0	0	1	0
182402	AFB Culture and Smear, Broth	1	0	0	0	0	0	1	0
008466	Organism ID, Mycobacteria	1	0	0	0	0	0	1	0
550087	M tuberculosis Detection, PCR	1	0	0	0	0	0	1	0
188540	M tuberculosis, PCR/Culture	1	0	0	0	0	0	1	0
086876	Mycoplasma pneumoniae Culture	0	0	0	0	0	0	1	0
138420	Mycoplasma Pneumoniae, PCR	0	0	0	0	0	0	1	0
163758	Mycoplasma pneu. IgG/IgM Abs	0	0	0	0	0	0	1	0
163741	Mycoplasma pneumoniae, IgG Ab	0	0	0	0	0	0	1	0
163212	Mycoplasma pneumoniae, IgM Ab	0	0	0	0	0	0	1	0
096065	Adenovirus Group Ab, Qn	1	0	0	0	0	0	1	0
138164	Adenovirus Detection by PCR	1	0	0	0	0	0	1	0
185033	Virus, Adenovirus by DFA	1	0	0	0	0	0	1	0
086173	B pertussis Smear, DFA	0	0	0	0	0	0	1	0
164384	B pertussis IgA Ab, Quant	0	0	0	0	0	0	1	0
164541	B pertussis IgG/M/A Ab, Quant	0	0	0	0	0	0	1	0
180224	B pertussis, Nasophar Culture	0	0	0	0	0	0	1	0
138677	Bordetella Para&Pertussis PCR	0	0	0	0	0	0	1	0
161745	B pertussis IgG Ab, Quant	0	0	0	0	0	0	1	0
163030	B pertussis IgG/IgM Ab, Quant	0	0	0	0	0	0	1	0
161752	B pertussis IgM Ab, Quant	0	0	0	0	0	0	1	0
008169	Beta-Hemolytic Strep, A Only	0	0	0	0	0	0	1	0
018788	Streptococcus pneumoniae Ag	0	0	0	0	1	0	1	0
018804	Beta Strep (Group B) Antigen	0	0	0	0	0	0	1	0
008532	Chlamydia psittaci Culture	0	0	0	0	0	0	1	0
138263	Chlamydia Pneumoniae PCR	0	0	0	0	0	0	1	0
018762	Haemophilus influenzae B Ag	0	0	0	0	0	0	1	0
138271	Haemophilus influenzae B IgG	0	0	0	0	0	0	1	0
182295	Influenza A Only by Direct EIA	0	0	0	0	0	0	1	0
186023	Viral Culture,Rapid,Influenza	0	0	0	0	0	0	1	0
096487	Influenza A/B Ab, Quant	0	0	0	0	0	0	1	0
186064	Influenza A & B, Immunoassay	0	0	0	0	0	0	1	0
096214	Parainfluenza Virus Antibody	0	0	0	0	0	0	1	0

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
086868	Legionella Species Culture	1	0	0	0	0	0	1	0
182246	Legionella pneumophila Ur Ag	1	0	0	0	0	0	1	0
085506	Legionella pneumophila by DFA	1	0	0	0	0	0	1	0
188227	Legionella pneumophila/Culture	1	0	0	0	0	0	1	0
096131	RSV Ab, Quant	0	0	0	0	0	0	1	0
185017	Virus, RSV by DFA	0	0	0	0	0	0	1	0
014548	RSV by EIA	0	0	0	0	0	0	1	0
008342	Upper Respiratory Culture	0	0	0	0	0	0	1	0
180810	Lower Respiratory Culture	0	0	0	0	0	0	1	0
186015	Viral Culture,Rapid,Respirator	0	0	0	0	0	0	1	0
164608	Brucella abortus IgG, EIA	1	0	0	0	0	0	1	0
164624	Brucella abortus IgM, EIA	1	0	0	0	0	0	1	0
163709	Diphtheria Antitoxoid Ab	0	0	0	0	0	0	1	0
016774	Q Fever Antibodies, IgG	1	0	0	0	0	0	1	0
058503	RESPIRATORY INFECTION PROF A	0	0	0	0	0	0	1	0
057877	RESPIRATORY INFECTION PROF B	0	0	0	0	0	0	1	0
058669	Respiratory Infection Prof D	0	0	0	0	0	0	1	0
091454	Fungal Antibodies, Quant	0	0	0	0	0	0	1	0
164319	Histoplasma Abs, Qn, DID	0	0	0	0	0	0	1	0
180885	Helicobacter pylori Culture	0	1	0	0	0	0	0	0
163683	H PYLORI, IGM, IGG, IGA AB	0	1	0	0	0	0	0	0
162289	H. pylori IgG, Abs	0	1	0	0	0	0	0	0
180764	H. pylori Stool Antigen	0	1	0	0	0	0	0	0
163170	Helicobacter pylori, IgA	0	1	0	0	0	0	0	0
163204	Helicobacter pylori, IgM Ab	0	1	0	0	0	0	0	0
086181	C difficile Toxin A	0	1	0	0	0	0	0	0
180448	C difficile, Toxin B/Cytotoxin	0	1	0	0	0	0	0	0
008045	Clostridium difficile Culture	0	1	0	0	0	0	0	0
180141	Campylobacter Culture	0	1	0	0	0	0	0	0
180356	Enterohemorrhagic E coli Cult	0	1	0	0	0	0	0	0
187013	Adenovirus (40/41)/Rotavirus	0	1	0	0	0	0	0	0
185041	Adenovirus (40/41), Direct EIA	0	1	0	0	0	0	0	0
138307	Norovirus, RT-PCR	0	1	0	0	0	0	0	0
006866	Rotavirus Detection by EIA	0	1	0	0	0	0	0	0
008755	Cryptosporidium Smear, Stool	0	1	0	0	0	0	0	0
006874	Amebiasis Antibodies	0	1	0	0	0	0	0	0
183145	Cyclospora Smear, Stool	0	1	0	0	0	0	0	0
182204	Giardia lamblia, Direct, EIA	0	1	0	0	0	0	0	0
188110	Giardia, EIA; Ova/Parasites	0	1	0	0	0	0	0	0
008144	Stool Culture	0	1	0	0	0	0	0	0
182410	Stool Culture, Yersinia Only	0	1	0	0	0	0	0	0
182311	Stool Culture, Vibrio Only	0	1	0	0	0	0	0	0
008656	White Blood Cells (WBC), Stool	0	1	0	0	0	0	0	0
008607	Occult Blood, Stool	0	1	0	0	0	0	0	0
008623	Ova/Parasites Exam, Routine	0	1	0	0	0	0	0	0

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
016766	Fecal Reducing Substances	0	1	0	0	0	0	0	0
002048	Glucose, Cerebrospinal Fluid	0	0	0	0	1	0	0	0
002055	Protein, Total, CSF	0	0	0	0	1	0	0	0
006890	Bacterial Antigens	0	0	0	0	1	0	0	0
005256	Cell Count, CSF	0	0	0	0	1	0	0	0
162016	Calif Encephalitis Ab, IgG	0	0	0	0	1	0	0	0
162313	Calif Encephalitis Ab, IgM	0	0	0	0	1	0	0	0
008672	India Ink Preparation	0	0	0	0	1	0	0	0
082891	Cryptococcus Antibodies, Quant	0	0	0	0	1	0	0	0
160747	Cryptococcus Antigen, CSF	0	0	0	0	1	0	0	0
006551	Cryptococcus Antigen, Serum	0	0	0	0	1	0	0	0
162024	East Eq Encephalitis Ab, IgG	0	0	0	0	1	0	0	0
162321	East Eq Encephalitis Ab, IgM	0	0	0	0	1	0	0	0
162032	St Louis Enceph V Ab, IgG	0	0	0	0	1	0	0	0
162339	St Louis Enceph V Ab, IgM	0	0	0	0	1	0	0	0
162040	Western Equine Enceph Ab, IgG	0	0	0	0	1	0	0	0
162347	Western Equine Enceph Ab, IgM	0	0	0	0	1	0	0	0
138842	West Nile Virus Antibody, Serum	1	0	0	0	1	0	0	0
138834	West Nile Virus, RT-PCR	1	0	0	0	1	0	0	0
138966	West Nile Virus Antibody, CSF	1	0	0	0	1	0	0	0
162305	Arboviral Encephalitis Ab, IgM	0	0	0	0	1	0	0	0
162008	Arboviral Encephalitis Ab, IgG	0	0	0	0	1	0	0	0
138293	JC/BK Virus DNA PCR	0	0	0	0	1	0	0	0
138636	Enterovirus RT-PCR	1	0	0	0	1	0	0	0
008201	Cytomegalovirus (CMV) Culture	1	0	0	1	0	0	0	0
185025	Virus, Cytomegalovirus by DFA	1	0	0	1	0	0	0	0
138610	Cytomegalovirus Quant. PCR	1	0	0	1	0	0	0	0
096727	Cytomegalovirus (CMV) Ab, IgM	1	0	0	1	0	0	0	0
138693	CMV PCR Southern Blot	1	0	0	1	0	0	0	0
550905	CMV DNA Probe, Paraffin	1	0	0	1	0	0	0	0
138701	CMV PCR Detect., Amniotic Fluid	1	0	0	1	0	0	0	0
186049	Viral Culture, Rapid, CMV	1	0	0	1	0	0	0	0
006536	Mono Qual W/Rflx Qn	1	0	0	1	0	0	0	0
006189	Mononucleosis Test, Qual	1	0	0	1	0	0	0	0
096230	EBV Ab VCA, IgG	1	0	0	1	0	0	0	0
160739	EBV Early Antigen Ab Prof, Qn	1	0	0	1	0	0	0	0
096248	EBV Early Antigen Ab, IgG	1	0	0	1	0	0	0	0
096735	EBV Ab VCA, IgM	1	0	0	1	0	0	0	0
138289	Epstein-Barr Virus Real Time	1	0	0	1	0	0	0	0
138230	Epstein-Barr DNA PCR Real Time	1	0	0	1	0	0	0	0
550913	Epstein-Barr Virus, DNA Probe	1	0	0	1	0	0	0	0
096552	Mumps Antibodies, IgG	0	0	0	1	0	0	0	0
006742	Tularemia Agglutinins	0	0	1	1	0	0	1	0
006478	Toxoplasma gondii Ab, IgG, Qn	0	0	0	1	0	0	0	0
138602	Toxoplasma Gondii PCR	0	0	0	1	0	0	0	0

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
016592	Rocky Mtn Spotted Fev, IgG, Qn	1	0	0	0	0	1	0	0
016667	Rocky Mtn Spotted Fever, IgM	1	0	0	0	0	1	0	0
096537	Rubella Antibodies, IgM	1	0	0	0	0	1	0	0
006197	Rubella Antibodies, IgG	1	0	0	0	0	1	0	0
500199	Human Papillomavirus, Biopsy	0	0	0	0	0	1	0	0
550020	Human Papillomavirus, PCR	0	0	0	0	0	1	0	0
186031	Viral Culture,Rapid,Varicella	0	0	0	0	0	1	0	0
185009	Virus, Varicella Zoster by DFA	0	0	0	0	0	1	0	0
096776	Varicella-Zoster Ab, IgM	0	0	0	0	0	1	0	0
096206	Varicella-Zoster V Ab, IgG	0	0	0	0	0	1	0	0
138313	VZV Real Time PCR	0	0	0	0	0	1	0	0
138719	Parvovirus B19 PCR Amn. FI Det	1	0	0	0	0	1	0	0
138644	Parvovirus B19 PCR Detection	1	0	0	0	0	1	0	0
057851	RASH PROFILE B	0	0	0	0	0	1	0	0
057844	Rash Profile A	0	0	0	0	0	1	0	0
058495	Measles/Mumps/Rubella Immunity	0	0	0	0	0	1	0	0
096560	Rubeola Antibodies, IgG	0	0	0	0	0	1	0	0
161075	HHV-6, IgG Antibodies, Quant	0	0	0	0	0	1	0	0
186056	Viral Culture,Rapid,Lesion	0	0	1	0	0	1	0	0
008508	Virus, HSV by DFA	0	0	1	0	1	1	0	0
138651	HSV 1/2 PCR	0	0	1	0	1	1	0	0
008250	HSV Culture and Typing	0	0	1	0	0	1	0	0
164020	HSV I/II, IgG/Rfx Type II IgG	0	0	1	0	0	1	0	0
163147	HSV Type 2-Specific Ab, IgG	0	0	1	0	0	1	0	0
164806	HSV, IgM I/II Combination	0	0	1	0	0	1	0	0
550921	Herpes Simplex Virus, DNA	0	0	1	0	0	1	0	0
186072	HSV Culture Without Typing	0	0	1	0	0	1	0	0
163014	Herpes Simplex Virus I/II, IgG	0	0	1	0	0	1	0	0
182337	Dermatophyte Only, Culture	0	0	0	0	0	1	0	0
008664	Organism ID, Bacteria	0	0	0	0	0	0	0	1
182212	Organism Identification, Yeast	0	0	0	0	0	0	0	1
008334	Genital Culture, Routine	0	0	0	0	0	0	0	1
008086	Urine Culture, Comprehensive	0	0	0	0	0	0	0	1
008458	Reference Bacterial Culture ID	0	0	0	0	0	0	0	1
008680	Susceptibility, Aer & Anaerob	0	0	0	0	0	0	0	1
008219	Parasite Identification	0	0	0	0	0	0	0	1
008482	Fungus (Mycology) Culture	0	0	0	0	0	0	0	1
008136	Fungus Stain	0	0	0	0	0	0	0	1
188243	Fungus Culture With Stain	0	0	0	0	0	0	0	1
096719	Candida Antibodies, Qual	0	0	0	0	0	0	0	1
096289	Anti-DNase B Strep Antibodies	0	0	0	0	0	0	0	1
163253	Tetanus/Diphtheria Ab	0	0	0	0	0	0	0	1
096180	Chlamydia Antibodies, IgG	0	0	0	0	0	0	0	1
182550	Chlamydia trach.Swab/Urine,PCR	0	0	0	0	0	0	0	1
096149	Chlamydia trachomatis Ab, IgM	0	0	0	0	0	0	0	1

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
008565	Chlamydia trachomatis Culture	0	0	0	0	0	0	0	1
138768	Echinococcus Antibody	0	0	0	0	0	0	0	1
006734	Hep A Ab, IgM	0	0	0	0	0	0	0	1
006726	Hep A Ab, Total	0	0	0	0	0	0	0	1
016881	Hep B Core Ab, IgM	0	0	0	0	0	0	0	1
006718	Hep B Core Ab, Tot	0	0	0	0	0	0	0	1
006395	Hep B Surface Ab	0	0	0	0	0	0	0	1
006510	Hep B Surface Ag	0	0	0	0	0	0	0	1
006635	Hep Be Ab	0	0	0	0	0	0	0	1
006619	Hep Be Ag	0	0	0	0	0	0	0	1
140608	Hep C Virus Ab	0	0	0	0	0	0	0	1
058552	HAV/HBV (Profile VII)	0	0	0	0	0	0	0	1
098418	HBV Core Ab, IgG/IgM Diff	0	0	0	0	0	0	0	1
255505	HBV/HCV (Profile VIII)	0	0	0	0	0	0	0	1
550033	HCV QuantaSure Plus (Serial)	0	0	0	0	0	0	0	1
550027	HCV QuantaSure Plus(Non-Graph)	0	0	0	0	0	0	0	1
551879	HCV RNA by PCR, Qn Rfx Geno	0	0	0	0	0	0	0	1
550400	HCV RNA, PCR, Qualitative	0	0	0	0	0	0	0	1
028928	Hepatitis A (Prof V)	0	0	0	0	0	0	0	1
058545	Hepatitis B Virus (Profile VI)	0	0	0	0	0	0	0	1
550475	Hepatitis C Virus Genotyping	0	0	0	0	0	0	0	1
046938	Hepatitis Follow-Up (Prof II)	0	0	0	0	0	0	0	1
322744	Hepatitis Panel (4)	0	0	0	0	0	0	0	1
045849	Hepatitis Pt Mgmt (Prof III)	0	0	0	0	0	0	0	1
058560	Hepatitis, Diagnostic (Prof I)	0	0	0	0	0	0	0	1
140615	NGI HBV SuperQuant	0	0	0	0	0	0	0	1
140622	NGI HBV UltraQual	0	0	0	0	0	0	0	1
140639	NGI HCV QuantaSure	0	0	0	0	0	0	0	1
140612	NGI HCV SuperQuant	0	0	0	0	0	0	0	1
140609	NGI HCV UltraQual	0	0	0	0	0	0	0	1
058537	HAV/HBV Immune Status (Pro IV)	0	0	0	0	0	0	0	1
551432	HBV DNA, Qualitative PCR	0	0	0	0	0	0	0	1
091108	HBV Follow-Up (Profile XII)	0	0	0	0	0	0	0	1
235473	HBV Prevaccination (Profile X)	0	0	0	0	0	0	0	1
265389	HBV Vaccine Follow-Up (Pro XI)	0	0	0	0	0	0	0	1
551242	HCV RNA Det QI Rfx Gen	0	0	0	0	0	0	0	1
551221	HCV RNA by PCR, Qn Rfx Geno	0	0	0	0	0	0	0	1
550146	HCV RNA, PCR, QI (Quant Rfx)	0	0	0	0	0	0	0	1
265397	Hepatitis B, Prenatal (Prof X)	0	0	0	0	0	0	0	1
138800	Strep pneumo IgG Ab (6 Sero)	0	0	0	0	0	0	0	1
138177	Strep pneumo IgG Ab (7 Sero.)	0	0	0	0	0	0	0	1
138704	Strep. pneumo.IgG Ab (4 Sero.)	0	0	0	0	0	0	0	1
138210	Strep.pneumo.IgG Ab (14 Sero)	0	0	0	0	0	0	0	1
038109	Prenat Infect Dis Ab, IgG, Qn	0	0	0	0	0	0	0	1
211581	Prenat Infect Dis Ab, IgM, Qn	0	0	0	0	0	0	0	1

Syndrome Selection

Order Code	Order Code Name	Fever	Gastro	Lesion	Lymph	Neuro	Rash	Resp	Sp Inf
163246	HTLV-I/II Antibodies, Qual	0	0	0	0	0	0	0	1
086884	Ureaplasma/Mycoplasma hominis	0	0	0	0	0	0	0	1

Over-the-counter (OTC) Product Categories

OTC data are organized into 20 product families. Based upon the syndrome definitions created by the working group, these categories were mapped to syndromes as listed in Table 3.

Table 3. OTC Categories

<u>OTCCategoryName</u>	Hemorrhagic Illness	Lymphadenitis	Gastrointestinal	Respiratory	Neurological	Rash	Fever
Thermometers	1	1	1	1	1	1	1
Stomach Remedies	1	1	1				
Internal Analgesics	1	1	1	1	1	1	1
Cough/Cold	1			1			
Baby/Child Electrolytes	1	1	1				
<u>Antifever</u> Pediatric	1	1	1	1	1	1	1
<u>Antifever</u> Adult	1	1	1	1	1	1	1
Bronchial Remedies				1			
Chest Rubs				1			
Cold Relief Adult Liquid				1			
Cold Relief Adult Tablet				1			
Cold Relief Pediatric Liquid				1			
Cold Relief Pediatric Tablet				1			
Cough Syrup Pediatric Liquid	1			1			
Cough Syrup Adult Liquid	1			1			
Cough Syrup Adult Tablet	1			1			
Diarrhea Remedies	1	1	1				
Nasal Product Internal				1			
Throat Lozenges				1			
Hydrocortisones	1				1	1	1

Analytical Techniques

Overview

Analytical techniques are used to indicate data anomalies that may require further investigation. Current analytical algorithms include adaptations of the CuSum and SMART algorithms.

CuSum is a short-term surveillance technique designed to indicate recent data values changes through comparison with a seven-day moving average. Days that have significant variation from the moving average are indicated in the application. CuSum is applied at the metropolitan reporting area (MRA) or state level rather than for individual zip codes. Individual scores (for each data source) are combined to generate a consolidated score for a region (MRA or state) for a given syndrome and day.

SMART utilizes a generalized linear model with at least one year of baseline data to calculate an expected value for a syndrome-data source-zip code combination. The observed number of records is compared to the expected, and significant differences are indicated in the application. Individual scores (for each data source and zip code) are combined to generate a consolidated score for a region (MRA or state) for a given syndrome and day.

SaTScan is a widely used spatio-temporal clustering technique currently under development for implementation in BioSense.

Zip Codes

Each state and MRA consist of a series of zip codes. There are some zip codes (point zip codes i.e. zip codes representing post office boxes, a floor of a building, an apartment complex, a national forest, etc) that do not have geographic attributes. These zip codes are mapped to the enclosing geographical zip code for data analysis and visualization. This allows data received for point zip codes to be displayed on maps.

Each data source utilizes a different zip code for data analysis and visualization.

- **DoD data** – The zip code of analysis and visualization is the medical treatment facility zip code. If the reported clinic zip code is a “point” zip code, the clinic zip code is mapped to the geographic enclosing zip code for analysis and visualization. The clinic zip code is utilized because DoD personnel can be stationed far from their home residences, and the clinic zip code may better represent their temporary residence location.
- **VA data** – The zip code of analysis and visualization is the patient residence zip code. If the reported patient zip code is a “point” zip code, the patient residence zip code is mapped to the geographic enclosing zip code for analysis and visualization.
- **LabCorp data** – Three possible zip codes may be utilized for analysis and visualization. The first choice is the patient residence zip code. If this zip code is not provided with the message, then the facility (that ordered the test) zip code is used. Finally, if neither of these zip codes is included in the message, the provider (test provider) zip code is used. If these zip codes are point zips, they will be mapped to their geographic enclosing zip codes for data analysis and visualization.

Vaccination-related Events

In the VA and DoD data, codes indicating vaccination-related events are received. For example, military personnel may receive smallpox vaccinations as part of their regularly scheduled deployment vaccinations. This information may be medically coded with a smallpox-related ICD-9 code as well as vaccination-related ICD-9 and/or CPT codes. To prevent such records from being included in the syndrome categorizations and/or the Sentinel Infection Alerts (as they are not health events due to an exposure, but rather related solely to vaccination), ICD-9 codes that are associated with other ICD-9 and/or CPT codes that indicate the need for a vaccination, administration of vaccination, adverse effects of vaccination, or that the patient is a chronic carrier of the disease will be excluded. This should reduce the “noise” in the data and the chance that a data anomaly or Sentinel Infection Alert will be produced due to vaccination-related events.

SMART

SMART¹ is a generalized linear modeling technique adapted under the advice of Ken Kleinman of Harvard. SMART model parameters are calculated weekly using over one year of baseline data. The SMART model includes parameters for day of the week, holiday, day after a holiday, and sine and cosine seasonal terms with an intercept difference for each zip code within a metropolitan area or state exclusive of its metropolitan areas.

Individual SMART Score

The SMART model calculates an expected number of records for a source-syndrome-zip code-day accounting for model parameters. The expected number of records is compared to the observed number of records. The calculated p-value based upon this comparison is transformed into a statistical measure of the time period before which you would expect to see such a deviation (the same approach in saying it's a 100-year flood). A more detailed description of this transformation can be found in the referenced paper. The expected time period for seeing this deviation determines the SMART score for the individual source-syndrome-zip code-day. If a statistically significant SMART anomaly is produced based upon a count less than five for a source-syndrome-zip code-day, BioSense has imposed a rule such that this anomaly will not be indicated in the application due to problems associated with sparse data.

Consolidated SMART Score

A consolidated SMART score is created to combine results across data sources and zip codes for a particular syndrome and day. The purpose of this consolidated SMART score is to present an overall SMART analytical result on the Analytical Home page to guide you towards syndromes that have elevated syndrome activity. The goal was to assist you in prioritizing which syndromes may require further investigation. The steps that go into computing the overall SMART score that is plotted on the punch cards on the BioSense Home page are as follows:

1. A SMART score is computed for each zip code and data source.
2. Each SMART score is grouped based on the SMART score range for that date and data source.

¹ Lazarus, Ross et al. *Use of automated ambulatory-care encounter records for detection of acute illness clusters, including potential bioterrorism events*. Emerging Infectious Diseases 8.8 (2002): 753-60.

Table 4. SMART Score Groupings

Bin	SMART Score Range
0	<100
1	100 - 500
5	>500 - 1000
100	> 1000

3. The number and percent of zip codes that fall into each bin, by data source and date, are calculated.
4. A score is computed by multiplying the bin and the percent of zip codes.
5. All the scores by day are summed to produce an overall score.
6. The daily average score is computed by dividing the total scores by the number of data sources reporting.

Table 5. SMART Example

(Total number of zip codes in state=150, where data sources include VA and DoD ambulatory care diagnoses)

Date	Source	Syndrome	Bin	Number of Zip Codes	Percent of Zip Codes	Score	Overall Score
6/19/2004	Ambulatory care diagnoses (DoD)	Gastrointestinal	0	115	76.67	0	
6/19/2004	Ambulatory care diagnoses (DoD)	Gastrointestinal	1	20	13.33	13.33	
6/19/2004	Ambulatory care diagnoses (DoD)	Gastrointestinal	5	10	6.67	33.33	
6/19/2004	Ambulatory care diagnoses (DoD)	Gastrointestinal	100	5	3.33	333	
6/19/2004	Ambulatory care diagnoses (VA)	Gastrointestinal	0	100	66.67	0	
6/19/2004	Ambulatory care diagnoses (VA)	Gastrointestinal	1	20	13.33	266.6	
6/19/2004	Ambulatory care diagnoses (VA)	Gastrointestinal	5	5	3.33	16.5	

Date	Source	Syndrome	Bin	Number of Zip Codes	Percent of Zip Codes	Score	Overall Score
6/19/2004	Ambulatory care diagnoses (VA)	Gastrointestinal	100	25	16.67	1667	291.22

The average score is plotted on a scale where low=0 and high=1000.

CUSUM

CuSum² is a technique adapted from the Early Aberration Reporting System (EARS). CuSum indicates recent data volume changes through comparison with moving averages. Days that have significant variation from the moving averages are indicated in the application. Due to the data variability, the CuSum is applied at the MRA or state level.

Individual CuSum Score

There are three scores being generated using the CuSum method; C1, C2, and C3. Each of these are calculated for each data source for a syndrome and day.

$C_1 = \frac{count - (MA_1 + s_1)}{s_1}$	C1 is a deviation (scaled in standard deviations) of the count from one standard deviation away from a 7 day moving average.
$C_2 = \frac{count - (MA_3 + s_3)}{s_3}$	C2 is a deviation (scaled in standard deviations) of the count from one standard deviation away from a 7 day moving average with a 3 day lag.
$C_3 = \sum_{i=0}^2 \frac{count - (MA_3 + s_3)}{s_3}$	C3 is the sum of the current and previous two days for the C2 score.

Figure 1. CuSum Methods

where

- MA1 = 7-day moving average with a 1 day lag
- MA3 = 7-day moving average with a 3 day lag
- s1 = 7-day moving standard deviation with a 1 day lag
- s3 = 7-day moving standard deviation with a 3 day lag

Counts that are three standard deviations or greater from the moving average are considered statistically significant. Any count less than five that results in a statistically significant CuSum result is excluded from appearing as a statistically significant anomaly in the BioSense application due to problems related to sparse data.

Consolidated CuSum Score

The steps that go into computing the overall CuSum score that is plotted on the syndrome punch cards on the BioSense Analytic home page are as follows:

² Hutwagner, Lori et al. *The Bioterrorism Preparedness and Response Early Aberration Reporting System (EARS)*. J Urban Health 80 (2003): 89i-96i.

- If only C1 is significant, then the CuSum score is 250.
- If only C2 is significant, then the CuSum score is 500.
- If C2 and C3 are significant, then the CuSum score is 750.
- If all three CuSum analytics are significant, then the CuSum score is 1000.
- The daily overall CuSum score is calculated by averaging across all data sources reporting and is plotted on the same scale as the SMART scores, where low=0 and high=1000.

BioSense Home Page

Overview

The BioSense home page is the initial page that displays after you have accepted the Data Use Agreement. From this page, you may navigate to various components within the BioSense application.

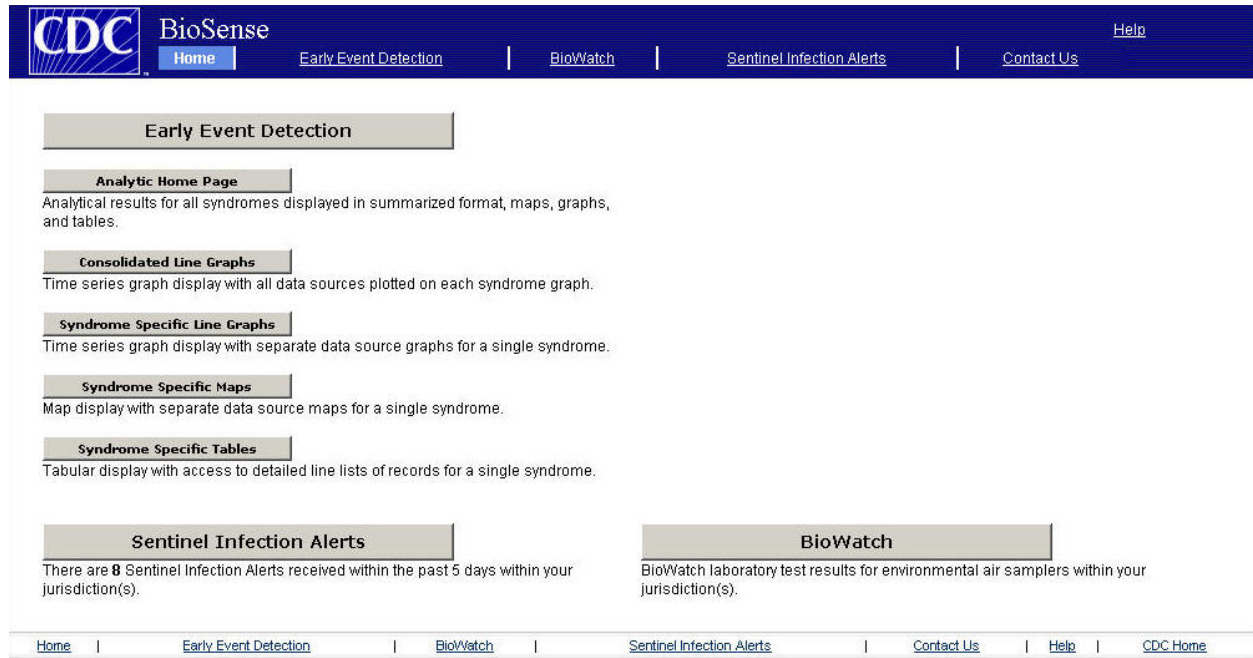


Figure 2. BioSense Home Page (demonstration data)

BioSense Analytic Home Page

This page presents summarized analytical results for the selected jurisdiction, information on the status of data loading, and records of diseases of public health concern. The Analytic home page is designed to provide indication of syndromes, health events, and/or information on potential patterns in the data that may require further investigation. It is crucial to note that these patterns may be due to irregularities in the data, rather than to actual outbreaks of disease. Because of this possibility, this page presents information on the performance of data transmission processes to give you immediate input regarding status of data sources.

The Analytic home page has three general content areas: (1) the Region Selection and Data Transmission section on the left, (2) the Analytic Summary section in the center, and (3) the Percentage of Records Received table at the bottom.

Region Selection and Data Transmission (Left Section)

The Region Selection and Data Transmission section (located on the left side of the screen) provides specific information on **Data Transmission**, informing you where there are problems in the data loading process as well as a **Region Selection** option (state and/or MRA).

Analytic Summary (Center Section)

Syndrome Punch Cards

The Analytic Summary section provides an overview of analytic results for each syndrome. SMART and CuSum qualitative results, consolidated for all syndromes for each day within the past ten days, are displayed in the punch cards at the top of the page. Elevated results in either analysis indicate there may be a data anomaly that warrants investigation. *Remember: An elevated analytical result does not indicate that an outbreak has occurred, only that an unusual number of records have been received.* High analytical results may be due to problems in data transmission or other events, such as addition of a new data collection point (health clinic or lab facility), rather than to an actual outbreak of disease. Detailed information on how these analytics are produced and interpreted can be found in the BioSense help documentation on Analytical Techniques. Each punch card provides a link to the SMART and CuSum results page for that syndrome.

Atlanta-Sandy Springs-Marietta, GA

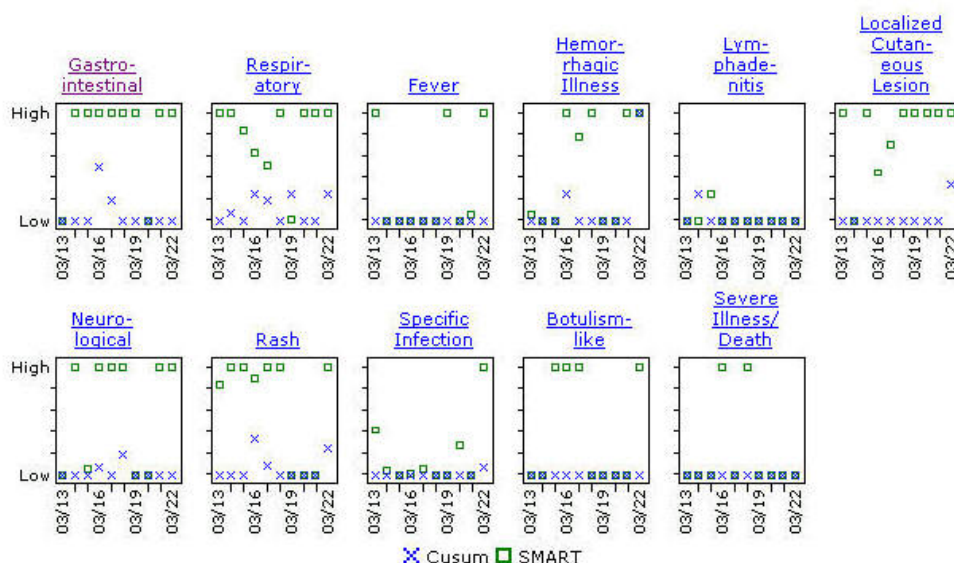


Figure 3. Syndrome Punch Cards (demonstration data)

Syndrome-specific SMART and CuSum Results Page

At the top of the syndrome-specific analytical results page are time series graphs of CuSum results for each data source with elevated CuSum scores. Significant CuSum scores are indicated by red stars and labeled as C1, C2, or C3 (or a combination) on the x-axis of the graph. On each graph, the colored line represents regional count data, the black line represents national count data, and the dashed line represents the 7-day moving average used in the CuSum calculation. Each graph provides a link to the Health Indicators line graph presentation page for the particular syndrome being viewed.

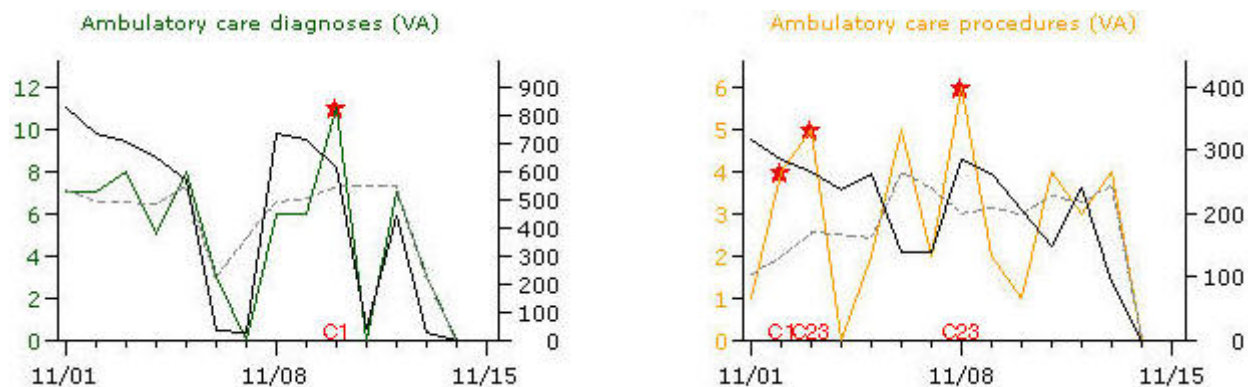


Figure 4. CuSum Results Graphs (demonstration data)

Beneath the graphs of CuSum results, SMART score results are presented in a map highlighting the Zip Codes where elevated SMART results were found for the selected syndrome on any day within the 14-day time window.

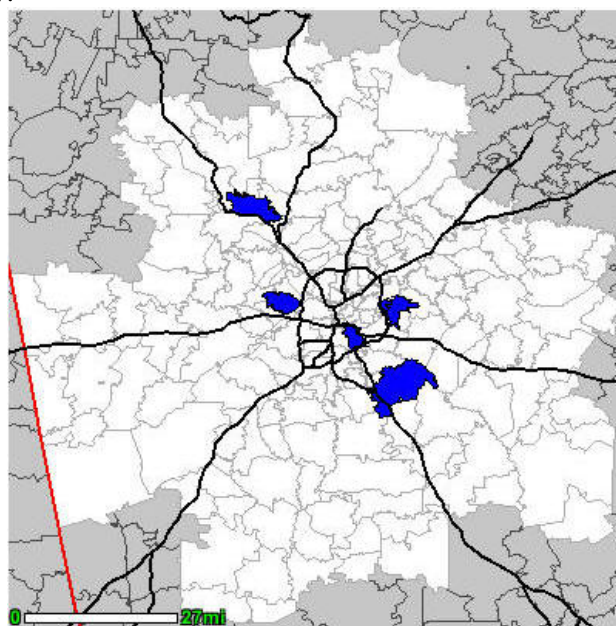


Figure 5. Smart Results Map (demonstration data)

Below the map display, a time series graph for each zip code/data source shows the elevated SMART score results indicated by red boxes. On these graphs, the colored line indicates regional count data, the black line indicates national count data, and the dashed gray line indicates the predicted value used in the SMART score calculation. *Note: Line graphs are not presented for zip codes that do not have elevated SMART Scores.*

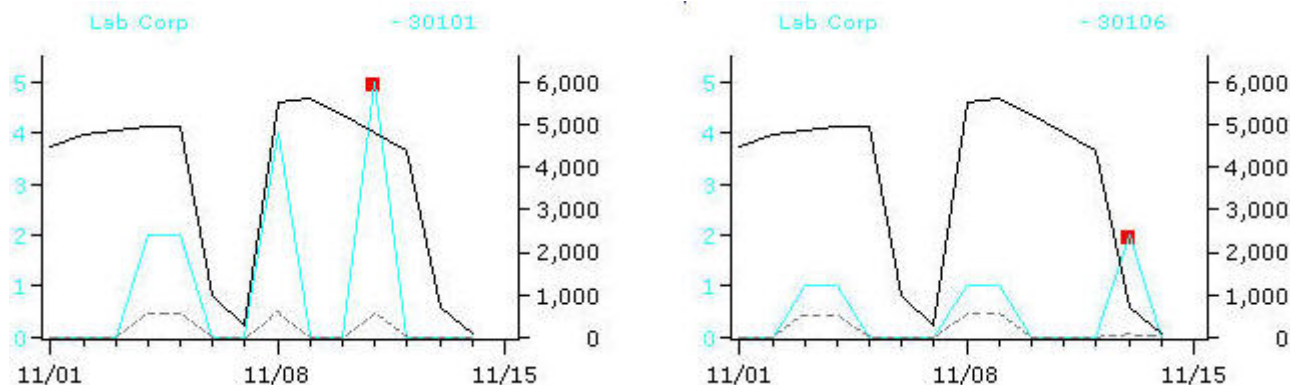


Figure 6. Smart Results Graphs (demonstration data)

At the bottom of the syndrome-specific analytics detail page, the table presents counts by Data Source, Date, and Zip Code. Within the table, the numbers of records provide links to the Health Indicators tabular presentation page specific for the syndrome, date, region (jurisdiction or zip code), and data source. Regional counts are highlighted if associated with an elevated CuSum score, and zip code counts are highlighted if associated with an elevated SMART score.

Ambulatory care diagnoses (VA)

Date	National	Regional	30101	30106	30111	30281	30310	30329
11/01/04	837	7	0	0	0	0	0	0
11/02/04	740	7	0	0	0	0	0	0
11/03/04	715	8	0	0	0	0	0	0
11/04/04	652	5	0	0	0	0	0	0
11/05/04	576	8	0	0	0	0	0	0
11/06/04	38	3	0	0	0	0	0	0
11/07/04	27	0	0	0	0	0	0	0
11/08/04	741	6	0	0	0	0	0	0
11/09/04	722	6	0	0	0	0	0	0
11/10/04	625	11	0	0	0	0	0	0
11/11/04	46	0	0	0	0	0	0	0
11/12/04	449	7	0	0	0	0	0	0
11/13/04	29	3	0	0	1	0	0	0
11/14/04	0	0	0	0	0	0	0	0
11/15/04	0	0	0	0	0	0	0	0


Figure 7. Syndrome-specific Table Listing (demonstration data)

Home Page Map

The map and table display in the center of the frame present syndrome and Zip Code SMART Results. To better display geographical data, point zip codes (i.e., zip codes representing post office boxes, building floors, an apartment complex, a national forest) are mapped to the enclosing geographical zip code.

The drop-down menu () above the table allows you to select a specific syndrome for display.

- The map presents highlighted Zip Codes where elevated SMART Score results have occurred.

- The slide bar () above the map allows you to view the geographical distribution of elevated scores for all days within the 10-day time frame or for a specific day. The selected date and day of the week appear under the slide bar.
- Hovering over a Zip Code with the mouse will produce a pop-up legend that indicates the zip code number.
- When any syndrome is selected, the table indicates zip codes with elevated SMART scores over the 10-day window with an "X". When a specific syndrome is selected, the table presents count information for each data source and day within the 10-day window. The upper portion of the table presents count information for the entire jurisdiction and highlights counts that triggered an elevated CuSum score. The lower portion of the table presents count information only for those zip codes that triggered an elevated SMART score and highlights counts that triggered an elevated SMART score.

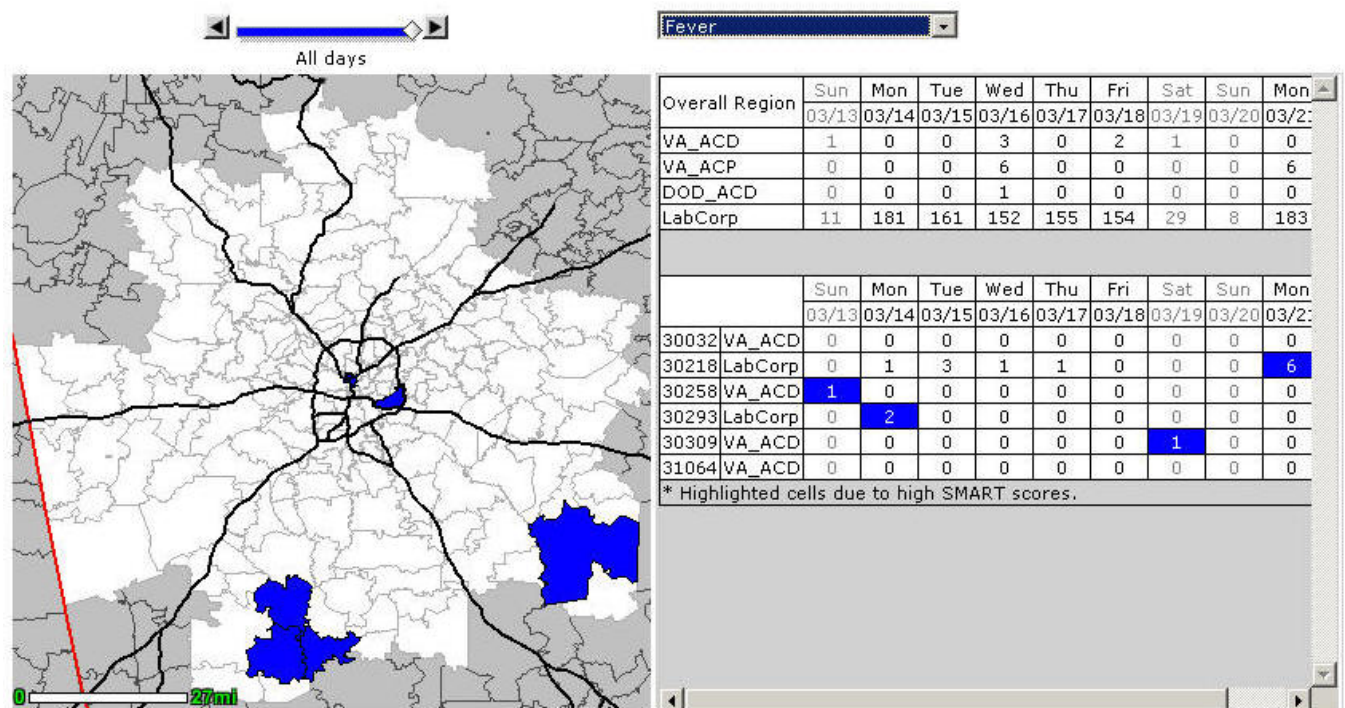


Figure 8. BioSense Home Page Map with a Specific Syndrome Selected (demonstration data)

Percentage of Records Received Table (Bottom Section)

Percentage of Records Received lists data receipt status, by data source, for the past 10 days. Information is shown as a percentage of the records received versus the number expected to be received based on a historical day of week average. Thus, low percentages indicate that full data delivery has not occurred (or that the day is a holiday), while percentages well above 100% could indicate that data may have been duplicated in the transmission process or that there has been a recent increase in the number of facilities reporting data. These examples are presented to illustrate that unusual analytical results may be due to issues in data transmission rather than to outbreaks of disease.

Mouse-over functionality displays the number of records that have been received for that particular date and data source, as well as the historical day of week average on which the percentage of records received is based.

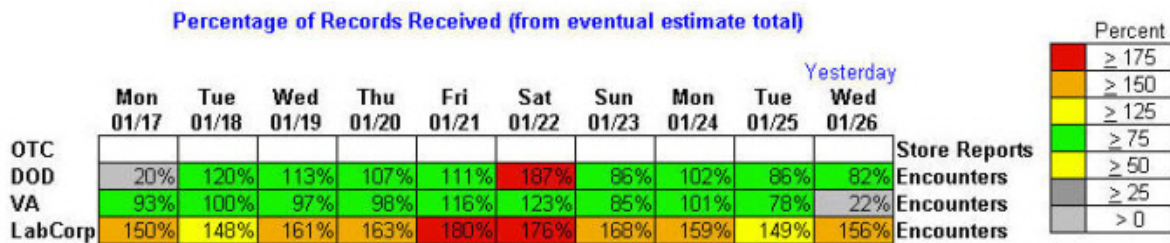


Figure 9. Percentage of Records Received Table (demonstration data)

Consolidated Line Graphs

These time series graphs provide a consolidated view of the data for each syndrome by plotting all data sources on a single graph. To view line graphs, maps, and tables for a specific syndrome, click the consolidated line graph for that syndrome, or select a syndrome from the left margin.

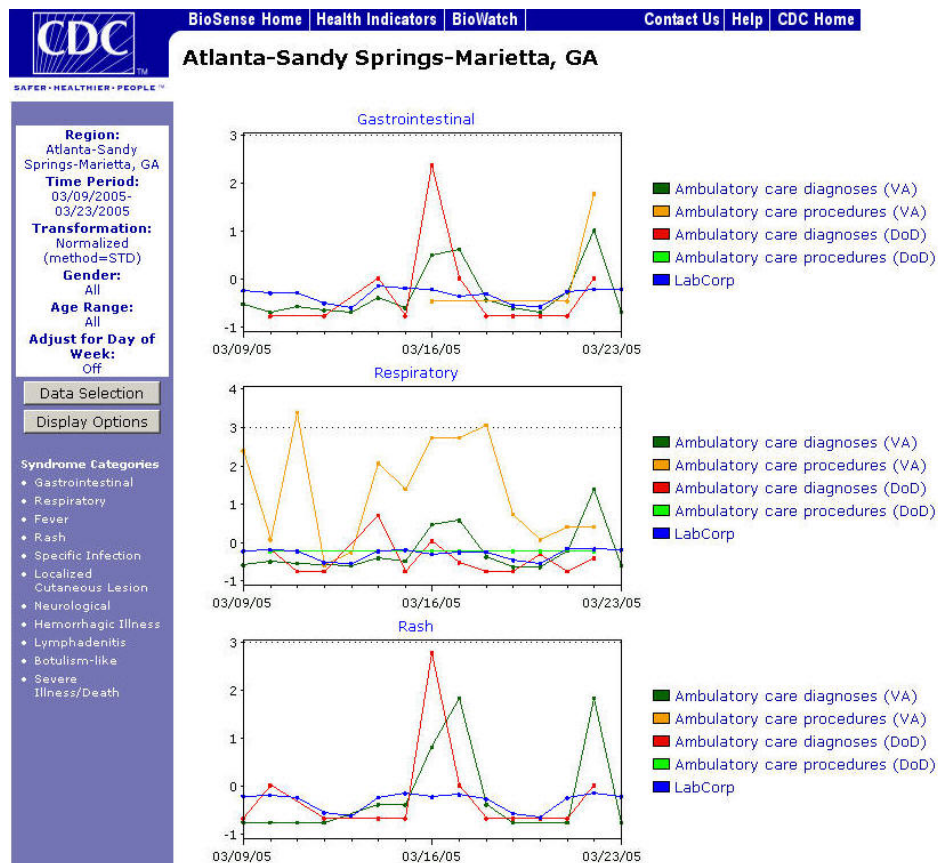



Figure 10. Consolidated Line Graphs (demonstration data)

Syndrome-specific Line Graph Presentation

The Line Graph presentation displays the syndrome consolidated graph as well as a line graph for each of the data sources. Data source-specific graphs show the count of records (by default, but transformation options are available) for a particular data source, both for your jurisdiction and the

nation. This allows you to determine if the data pattern for your jurisdiction matches the pattern for the nation.

There is a mouse-over feature for the individual data points on the graph lines. A pop-up indicates the data source, date, and record count associated with the graph point. You can click on a graph point and navigate to the tabular presentation for that data source, date, and record count, where the detailed record level line listing of information is available.

A time-shift feature () located with the labels for a single source graph allows a forward or backward shift in the viewing time window a day at a time for a given data source. The line graph for that source also shifts in the consolidated graph. This is a visual mechanism to check correlations among data sources, since a health related event might have different latency in different data sources.

Gastrointestinal

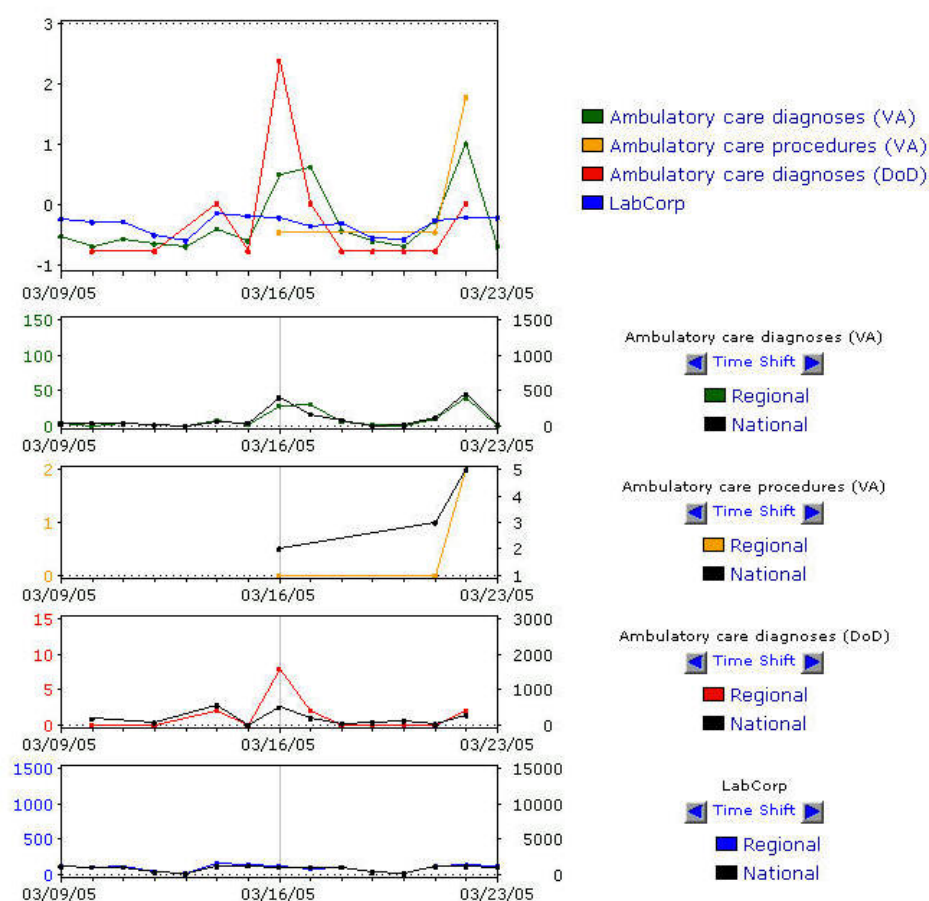


Figure 11. Line Graph Presentation (demonstration data)

Syndrome-specific Map Presentation

The Map presentation displays a map of the jurisdiction for each data source. Zip codes are color-coded based on the range of syndrome health events occurring in the zip code for the specific data source. To better display data geographically, point zip codes (i.e. zip codes representing post office

boxes, building floors, an apartment complex, a national forest, etc) are mapped to the enclosing geographical zip code. Note: Zip codes are color-coded based on the data transform; “No transform” is the default; however, other options are available. By default, the values for each day over a selected time range are summed across the selected time frame.

The maps feature zoom capabilities allowing you to zoom in on a specific area to better discriminate between zip codes within small geographic boundaries. To display a portion of the map, use the Zoom tools and Directional arrows. The red dot in the center of the Zoom tools will return the map presentation to the full view. Mouse-over functions are also available to provide descriptive information including post office name, zip code, population, and record counts for that zip code. There are several GIS overlay layers available in the Display Options pop-up including the display of borders (state, county, zip) and highways.

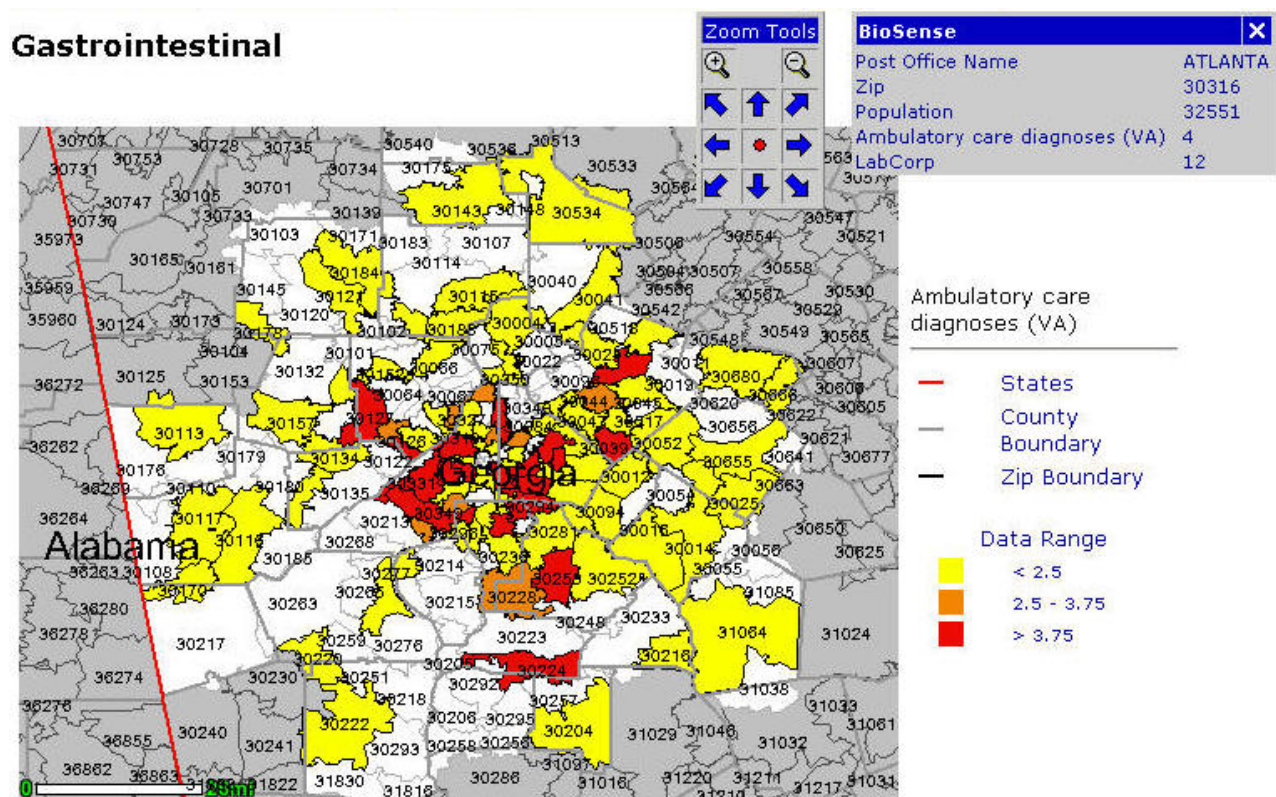


Figure 12. Map Presentation (demonstration data)

Syndrome-specific Tabular Presentation

The Tabular presentation presents a summary table of the number of syndrome health events by date and by data source. These tables provide drill-down levels and filtering capability.

1. To locate the zip code in which an event was reported, select the count for the specified date.
2. To view individual records associated with the chosen zip code for the specified date, select the count for the zip code.
3. View the individual records.
4. (Optional) To sort a table by any column header, click the header.

Rows in the table may be filtered in three ways:

- **Include:** Only display rows containing the entered value in the selected column.
- **Exclude:** Only display rows that do not contain the entered value in the selected column.
- **Clear:** Clear filter values and show all rows.

Ambulatory care diagnoses (VA) - Respiratory - 11/13/2005

Rows with the value in column [Help](#)

Analysis Zip	Analysis Zip Key *	Patient Zip	Health Facility Visited	Health Facility Home	Patient ID	Age	Gender	ICD-9	ICD-9 Description	Visit ID	Message ID
10710	P	NY-10710	526	526	52600000000195656	83	M	786.2	COUGH	CVTRC-BRX	31cd4b20-1a80-4028-8001-00065BF67B37
10010	P	NY-10010	630	630	63000000000211085	65	M	493.90	ASTHMA W/O STATUS ASTHMAT	10M5NC-NYN	cf889f80-1a8b-4028-8001-00065BF67B37
07005	P	NJ-07005	561A4	613	56100000000284043	57	M	493.90	ASTHMA W/O STATUS ASTHMAT	RX6F8-NJH	98afdc20-1a64-4028-8001-00065BF676EE
10459	P	NY-10459	630	630	63000000000097672	58	F	786.05	SHORTNESS OF BREATH	10M6X3-NYN	36b966d0-1a8c-4028-8001-00065BF67B37
11385	P	NY-11385	630	630	63000000000128381	54	M	786.05	SHORTNESS OF BREATH	10M16Q-NYN	172fef60-1a8b-4028-8001-00065BF67B37
10035	P	NY-10035	630	630	63000000000033834	73	M	786.3	HEMOPTYSIS	10M50F-NYN	c6a86fd0-1a8b-4028-8001-00065BF67B37
11207	P	NY-11207	630	630	63000000000150641	45	M	493.90	ASTHMA W/O STATUS ASTHMAT	10M614-NYN	e1da4260-1a8b-4028-8001-00065BF67B37

Figure 13. Tabular Presentation (demonstration data)

VA Diagnosis Data

- Analysis Zip – Zip code used for data analysis and visualization
- Analysis Zip Key:
 - P = Patient's zip code
 - P-CALC = calculated patient zip code (reported zip code was a "point" zip code and was mapped to the geographic enclosing zip code)
- Patient Zip – Reported patient residence zip code (will be the same as the zip code used for data analysis and visualization if the reported patient zip code was not a "point" zip code) and patient's state of residence
- Health Facility Visited – VA facility where the patient-provider encounter occurred
- Health Facility Home – Regional VA facility to which the patient is assigned (More information about the VA facilities' reporting data can be found at the VA website, <http://www1.va.gov/directory/guide/home?isFlash=1>)
- Patient ID – Identifies a patient within the VA medical records system
- Age – Age of patient
- Gender – Gender of patient
- ICD-9 – ICD-9-CM code for diagnosis
- ICD-9 Description – Text description of the ICD-9 diagnosis
- Visit ID – Unique identifier for the patient visit
- Message ID – Unique identifier for the record

Each message ID links to a pop-up window that provides all the ICD-9 and CPT codes for the patient visit that map to syndrome categories. This provides you with a more complete clinical picture for the patient's visit.

VA Procedure Data

VA procedure data includes all the above information except the ICD-9 and ICD-9 Description. Instead, CPT and CPT description are included which indicate the clinical procedure code associated with the record.

DoD Diagnosis Data

- Analysis Zip – Zip code used for data analysis and visualization
- Analysis Zip Key:
 - C = Clinic's zip code
 - C-CALC = calculated clinic zip code (reported zip code was a "point" zip code and was mapped to the geographic enclosing zip code)
- Clinic Zip – Reported clinic zip code (will be the same as the zip code used for data analysis and visualization if the reported clinic zip code was not a "point" zip code)
- Clinic State – State in which the clinic is located
- Patient Zip – Reported patient residence zip code (will be the same as the zip code used for data analysis and visualization if the reported patient zip code was not a "point" zip code) and patient's state of residence
- Age – Age of patient
- Gender – Gender of patient
- ICD-9 – ICD-9-CM code for diagnosis
- ICD-9 Description – Text description of the ICD-9 diagnosis
- Disposition (each individual disposition code links to a pop-up that contains the following information)
 - 1 = Released without limitations
 - 2 = Released with work/day limitations
 - 3 = Sick at home/quarters
 - 4 = Immediate referral
 - 5 = Left without being seen
 - 6 = Left against medical advice
 - 7 = Admitted
 - 8 = Expired
 - A = Transferred to another hospital
 - B = Transferred to an SNF
 - C = Transferred to another clinical service
 - D = Continued stay
 - E = Left against medical advice
 - F = Discharged home
 - G = Expired
- Health Facility Visited – DoD facility where the patient-provider encounter occurred (more information regarding DoD facilities can be found at the DoD Medical Treatment Facility website, which is updated monthly with organization codes and facility information, <http://www.dmisid.com/cgi-dmis/download>)
- Patient Type (each patient-type code links to a pop-up that contains the following information)
 - 1 = inpatient
 - 0 = outpatient
- Visit Type (each visit-type code links to a pop-up that contains the following information)

- 1 = Appointment scheduled
- 3 = Walk-in
- 4 = Sick call
- 6 = Telephone consultation
- 8 = Cancelled by facility
- 9 = Cancelled by patient
- Visit ID – Unique identifier for the patient visit
- Message ID – Unique identifier for the record

Each Message ID links to a pop-up window that provides all the ICD-9 and CPT codes for the patient visit that map to syndrome categories. This provides you with a more complete clinical picture for the patient's visit.

DoD Procedure Data

DoD procedure data includes all the above information except the ICD-9 and ICD-9 Description. Instead, CPT and CPT description are included which indicate the clinical procedure code associated with the record.

LabCorp Test Order Data


- Analysis Zip – Zip code used for data analysis and visualization
- Analysis Zip Key:
 - P = Patient's zip code (First choice for data analysis and visualization)
 - P-CALC = calculated patient zip code (reported patient zip code was a "point" zip code and was mapped to the geographic enclosing zip code)
 - F = facility zip code (If patient zip code not provided with the message, facility zip code is used for data analysis and visualization)
 - F-CALC = calculated facility zip code (reported facility zip code was a "point" zip code and was mapped to the geographic enclosing zip code)
 - PR = provider zip code (If neither patient nor facility zip code are provided with the message, then provider zip code is used for data analysis and visualization)
 - PR-CALC = calculated provider zip code (reported provider zip code was a "point" zip code and was mapped to the geographic enclosing zip code)
- Patient State – Patient's state of residence
- Patient ID – Unique identifier for the patient's lab tests for that facility and day
- Age – Age of patient
- Gender – Gender of patient
- Test Group Code – Code associated with the test group (basis for syndrome mapping); (More information about these codes can be found on the Laboratory Corporation of America website, <http://www.labcorp/dos/index.html> by navigating to the "Numerical Index.")
- Test Group Description – Text description of the test group code
- Facility – LabCorp facility name
- Message ID – Unique identifier for the record

Each message links to a pop-up window that provides further information regarding the record including all tests associated with the patient and ICD-9-CM codes associated with the reasons for the test orders. This provides you with a more complete clinical picture for the patient's visit.




Over-the-counter (OTC) Data

- Zip – Store zip code
- State – Store state
- Units Purchased - Quantity for OTC sales
- Promotion - Item purchased as part of a sale
- OTC Category – Over-the-counter category
- Message ID – Unique identifier for the record

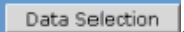
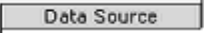



Data Selection Button

The  button allows you to choose which data sources will be included in your line graphs, maps, and tables. By using this button, you can see more detail concerning states or regions and can focus down to the zip code level.


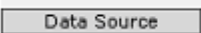
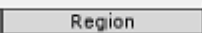
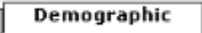

Customizing Data Sources

1. From the Syndrome-specific pages, click .
The Data Source tab appears.
2. Click the data sources you want to include. *Note: The default selection is “All.”*
There are six available data sources:
 - Select over-the-counter drug sales
 - Ambulatory care diagnoses (Veteran’s Administration [VA])
 - Ambulatory care procedures (VA)
 - Ambulatory care diagnoses (Department of Defense [DoD])
 - Ambulatory care procedures (DoD)
 - LabCorp
3. To have the displayed values adjusted to line up the averages for each day of the week, check the ☐  box. *Note: Since the data has a strong weekly cycle (many sources show greatly reduced activity on the weekends), it may be useful to be able to remove the cycle through the addition of the difference in day-of-week average. This simple method of alignment takes seven averages (one for each day of the week) and adds or subtracts the appropriate amount from each day so that the day-of-week average becomes the same as the global average, then plots the difference from these averages.*
4. Click .

Customizing Regions

1. To navigate among state, MRA, and zip code, click .
The Data Selection box appears.
2. Click the    tab.
3. Select a **Region Type** from the drop-down menu.
4. Select a **Region** from the drop-down menu.
5. To view more specific information, enter selected zip codes, separated by commas, in the **Zips** text area.
6. Click .

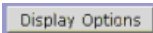



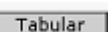
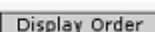

Customizing Demographics

1. To select data based on demographics, click .
The Data Selection box appears.
2. Click the   **Demographic**  tab.
3. Select an **Age** group. *Note: The default is “All.”*
4. Select a **Gender**. *Note: The default is “All.”*
5. Click .

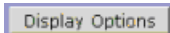
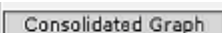
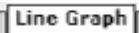

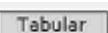
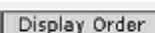
Display Options Button

The Display Options feature allows you to customize line graphs, maps, and tables in the single syndrome pages. Changes made in Display Options are saved as preferences and remain in effect until you save new ones.

Customizing Consolidated Line Graphs

1. From the Consolidated Line Graph page, click .
2. Click the      tab.
3. From here, you can:
 - Change the size of the graph with the **Height** and **Width** options
 - Select a method of **Data Transformation** (refer to Health Indicators for an explanation of these options)
 - Change the **Vertical Axis** of the graph
 - Set a reference line
 - Change the **Horizontal Axis** of the graph
 - Change **Legend Placement** or remove the legend
 - Change the **Date Range** to be included in the display. *Note: When changing a date range, check ☐ All displays use same dates to populate other syndrome-specific views (line graph, map, and tabular) with the same date range. (TIP: If values appear as NULL after changes have been made, try expanding the Date Range to include more data.)*
4. Click .

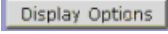
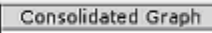





Customizing Syndrome-specific Line Graphs

1. From the Syndrome-specific pages, click .
2. Click the      tab.
3. On this tab, you can:
 - Change the size of the graph (in pixels) with the **Height** and **Width** options
 - Select a method of **Data Transformation**
 - Change information in the **Vertical Axis** of the graph
 - Set a reference line
 - Choose to display and change the color of the national graph line
 - Change information in the **Horizontal Axis** of the graph
 - Change the **Date Range** to be included in the display. *Note: When changing a date range, check ☐ All displays use same dates to populate other syndrome-specific views (line graph, map,*

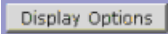






and tabular) with the same date range. (**TIP:** If values appear as NULL after changes have been made, try expanding the Date Range to include more data.)

4. Click .

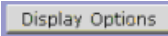

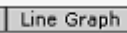








Customizing Single Syndrome Maps

1. From the Syndrome Specific pages, click .
- The Display Options pop-up appears.
2. Click the      tab to view map customization options.
3. To alter the size of your map view, change the Height and Width numeric values. *Note: The default values are 500 Height and 500 Width. The map scale can be changed.*
4. Select a type of **Data Transformation**. *Note: The default is “none.”*
5. To select additional **Map Layers**, click the check boxes.
6. Select **Map Values** and **Number of Levels** to which the map values will be binned.
7. Change the **Date Range** to be included in the display. *Note: When changing a date range, check ☐ All displays use same dates to populate other syndrome-specific views (line graph, map, and tabular) with the same date range. (**TIP:** If values appear as NULL after changes have been made, try expanding the Date Range to include more data.)*
8. Click .

Customizing Single Syndrome Tabular View

1. From the Syndrome Specific pages, click .
- The Display Options pop-up appears.
2. To view customizations options, click the      tab.
3. Select a type of **Data Transformation**. *Note: The default is “None.”*
4. Select a **Time Period**. *Note: When changing a date range, check ☐ All displays use same dates to populate other syndrome specific views (line graph, map, and tabular) with the same date range. (**TIP:** If values appear as NULL after changes have been made, try expanding the Date Range to include more data.)*
5. Click .

Customizing Display Order

1. From the Syndrome Specific pages, click .
2. Click the      tab.
3. To change the order of the graphs, click a **Syndrome**, then click the Up () or Down () arrows.
4. To change the order of a data source, click a source, then click the Up () or Down () arrows.
5. To change legend colors, click a color box, then click the color of your choice.
6. Click .

Note: Your data selection and display options are indicated in a labeling box on the left frame of the Health Indicator pages. Selected options will remain selected later in BioSense sessions, so you can use this box to see your current selections.

Region:
Atlanta-Sandy
Springs-Marietta, GA
Time Period:
01/12/2005-
01/26/2005
Transformation:
None
Gender:
All
Age Range:
All
**Adjust for Day of
Week:**
Off

Figure 14. Data Selection and Display Option Labeling Box

Sentinel Infection Alerts (SIA)

The SIA section presents records of CDC-classified Category A, B, and C.

ICD-9 codes that have been reported within your jurisdiction. Sentinel Infection Alerts represent rare diagnosis records that may not produce a data anomaly in the standard BioSense analytics and data displays, yet are important to bring to your attention. These diseases have been classified by CDC as potential bioterrorism diseases; further information can be found at <http://www.bt.cdc.gov/agent/agentlist-category.asp>. Note that these are *NOT* confirmed cases.

The list of ICD-9 codes selected to be included in the Sentinel Infection Alerts section are:

Category A Diseases

- 005.1 BOTULISM
- 020.0 PLAGUE, BUBONIC
- 020.1 CELLULOCUTANEOUS PLAGUE
- 020.2 PLAGUE, SEPTICEMIC
- 020.3 PRIMARY PNEUMONIC PLAGUE
- 020.4 SECONDARY PNEUMON PLAGUE
- 020.5 PNEUMONIC PLAGUE NOS
- 020.8 OTHER TYPES OF PLAGUE
- 020.9 PLAGUE NOS
- 021.0 ULCEROGLANDUL TULAREMIA
- 021.1 TULAREMIA, ENTERIC
- 021.2 PULMONARY TULAREMIA
- 021.3 TULAREMIA, OCULOGLANDULAR
- 021.8 TULAREMIA NEC
- 021.9 TULAREMIA NOS
- 022.0 CUTANEOUS ANTHRAX
- 022.1 PULMONARY ANTHRAX
- 022.2 GASTROINTESTINAL ANTHRAX

022.3 ANTHRAX, SEPTICEMIA
 022.8 ANTHRAX, OTHER SPECIFIED
 022.9 ANTHRAX, UNSPECIFIED
 050.0 SMALL POX, VARIOLA MAJOR
 078.7 ARENAVIRAL HEM FEVER

Category B Diseases

001.0 CHOLERA D/T VIB CHOLERA
 001.1 CHOLERA D/T VIB EL TOR
 001.9 CHOLERA NOS
 002.0 TYPHOID FEVER
 002.9 PARATYPHOID FEVER NOS
 003.0 SALMONELLA GASTROENTERITIS
 003.8 SALMONELLA INFECTION NEC
 003.9 SALMONELLA INFECTION UNSP
 004.0 SHIGELLA DYSENTERIAE
 004.1 SHIGELLA FLEXNERI
 004.2 SHIGELLA BOYDII
 004.3 SHIGELLA SONNEI
 004.8 SHIGELLA INFECTIONS OTHER
 004.9 SHIGELLOSIS, UNSPECIFIED
 005.0 STAPH FOOD POISONING
 005.2 FOOD POIS D/T C. PERFRINGENS
 007.4 CRYPTOSPORIDIOSIS
 008.01 ENTEROPATHOGENIC E COLI
 008.02 ENTEROTOXIGENIC E COLI
 008.03 ENTEROINVASIVE E COLI
 008.04 ENTEROHEMORRAGIC E COLI
 008.09 OTHER E COLI ENTERITIS
 008.41 STAPHYLOCOCC ENTERITIS
 023.0 BRUCELLA MELITENSIS
 023.1 BRUCELLA ABORTUS
 023.2 BRUCELLA SUI
 023.3 BRUCELLA CANIS
 023.8 BRUCELLOSIS NEC
 023.9 BRUCELLOSIS, UNSPECIFIED
 024 GLANDERS
 025 MELOIDIOSIS
 062.1 ENCEPHALITIS, WESTERN EQUINE
 062.2 ENCEPHALITIS, EASTERN EQUINE
 066.2 VENEZUELAN EQUINE FEVER

080 LOUSE-BORNE TYPHUS
 081.9 TYPHUS NOS
 083.0 Q FEVER

Category C Diseases

060.0 SYLVATIC YELLOW FEVER
 060.1 URBAN YELLOW FEVER
 060.9 YELLOW FEVER, UNSPECIFIED
 063.0 RUSSIAN SPRING-SUMMER (TAIGA) ENCEPHALITIS
 063.1 LOUPING ILL
 063.2 CENTRAL EUROPEAN ENCEPHALITIS
 063.8 OTHER SPECIFIED TICK-BORNE VIRAL ENCEPHALITIS
 063.9 TICK-BORNE ENCEPHALITIS, UNSPECIFIED
 065.0 CRIMEAN HEMORRHAGIC FEV
 065.1 OMSK HEMORRHAGIC FEVER
 065.2 KYASANUR FOREST DISEASE
 065.3 TICK-BORNE HEM FEVER NEC
 065.8 ARTHROPOD HEM FEVER NEC
 065.9 ARTHROPOD HEM FEVER NOS
 079.81 HANTAVIRUS INFECTION

These records are derived from the ICD-9 diagnoses received in the ambulatory care (VA and DoD) data sources; the information presented includes:

- Region – Area of the United States from which data is reported
- ICD-9 – ICD-9-CM code
- ICD-9 Description – Text description of the ICD-9 diagnosis
- CDC Disease Category – A, B, or C
- Visit date – Date of patient encounter
- Record received date – Date the record was received by BioSense
- Data Source – VA or DoD ambulatory care diagnoses
- Health Facility Visited – Medical facility where the patient encounter occurred
- Patient ID – Patient identifier within the VA medical records system
- Patient Type
 - 1 = Inpatient
 - 0 = Outpatient
- Age – Patient age
- Gender – Patient gender
- Visit ID – Unique identifier for the patient visit
- Visit Type
 - 1 = Appointment scheduled
 - 3 = Walk-in
 - 4 = Sick call
 - 6 = Telephone consultation
 - 8 = Canceled by facility
 - 9 = Canceled by patient
- Disposition
 - 1 = Released without limitations

- 2 = Released with work/day limitations
- 3 = Sick at home/quarters
- 4 = Immediate referral
- 5 = Left without being seen
- 6 = Left against medical advice
- 7 = Admitted
- 8 = Expired
- A = Transferred to another hospital
- B = Transferred to an SNF
- C = Transferred to another clinical service
- D = Continued stay
- E = Left against medical advice
- F = Discharged home
- G = Expired
- Links – Links to the Report and Add Comments

Reports

Overview

Automated SIA reports are generated on a daily basis for each SIA record received. These reports include all the information available to CDC regarding these records including clinic name and contact information when available. You may access these reports by clicking on the Report link available on the SIA page. These reports are subject to rigorous security standards utilized by the CDC Secure Data Network. In addition, access to this section is provided only to BioSense users who have approval to view data for a specific jurisdiction.

The count indicated on the BioSense Home page is the number of SIAs that have been received within your jurisdiction within the past five days and with patient encounter dates within the past 30 days. If an SIA meets an MRA and state geographic assignment, this record is only “counted” once for the purpose of display on the Home page.

Reports include the following information:

- Disease – Disease name and ICD-9 code
- CDC Disease Category – A, B, or C (<http://www.bt.cdc.gov/agent/agentlist-category.asp>)
- Syndrome Category – One or more of the 11 syndrome categories
- Diagnosis Count – Number of records received within the past five days with the specified ICD-9 code in the state or MRA
- Event Date – Date of the patient visit to the medical facility
- Date Record Received – Date the SIA record was received by BioSense
- Data Source – Department of Defense or Department of Veterans Affairs
- State/MRA – State and/or MRA associated with the SIA record
- Health Facility Visited – Code indicating the medical facility where the patient visit occurred (facility name, address, and telephone information provided)
- TRICARE Enrollment Site – Included with DoD reports only; indicates whether the medical facility where the patient visit took place is a TRICARE site
- Facility Type – Included with DoD reports only – indicates the type of medical facility where the patient visit took place (i.e., clinic)
- Zip Code of Specific DoD Clinic Visited – DoD reports only; indicates the zip code for the medical facility where the patient visit took place
- View VA Web Site – VA reports only; link to the VA online national medical facility directory
- DoD TRICARE Look-Up – DoD reports only; link to the DoD online national TRICARE medical facility look-up
- DoD Facility List Download – DoD reports only; link to the DoD online international list of facilities (both medical and non-medical); updated monthly
- VHA NPCD Patient ID – VA reports only; identifier that can be used by VA personnel to locate a patient in the VA medical records system
- Patient Zip – Patient residence zip code
- Patient Age – Patient age
- Patient Gender – Patient gender
- Visit ID – VA reports only; identifier for a patient’s visit to the VA medical facility
- Appointment ID – DoD reports only; identifier for a patient’s visit to the DoD medical facility; can be used by DoD personnel to locate a patient in the DoD medical records system
- Patient Visit Disposition Code – DoD reports only; number and explanation
 - 1 = Released without limitations

2 = Released with work/day limitations
3 = Sick at home/quarters
4 = Immediate referral
5 = Left without being seen
6 = Left against medical advice
7 = Admitted
8 = Expired
A = Transferred to another hospital
B = Transferred to an SNF
C = Transferred to another clinical service
D = Continued stay
E = Left against medical advice
F = Discharged home
G = Expired

- Associated Clinical Information – All ICD-9 and CPT codes received with the SIA record that are mapped to a syndrome category and the corresponding syndrome category

Comments

You (local, state, or federal) may elect to add comments or change the status of an SIA by clicking the **Add Comment** link available on the SIA page. Your comment, name, and date/time of submission will be saved and included at the top of the SIA report associated with the record.

Department of Veterans SIAs

The VA provided BioSense with information to be used by public health when investigating and following up on VA SIAs or anomalies. The information below is included in each VA SIA report. The VA provided BioSense with contact information for VA Chief Medical Officers at the Veterans Integrated Service Network (VISN) level, whom public health may contact regarding follow-up investigations. The VA created a website that staff may use to locate a patient in their system using the BioSense patient ID, a longitudinal patient identifier within each medical center system. Public health can provide this website to VA staff for its use.

Individuals conducting investigations regarding VA patients should contact the regional VISN Chief Medical Officer listed below to assist in locating the reported patient ID(s).

The VA has created an internal web page tool that VA staff from the Health Facility Visited should use to convert the patient ID listed in the VA SIA report to an actual patient. The patient record may be searched with the VA's Computerized Patient Record System (CPRS) to identify the specific diagnosis and/or procedure under investigation. If the Health Facility Visited has not yet used the VA web page, they should try to access it and then send an e-mail to:

vaaacbiosensesentinel@va.gov. The VA staff from either the VA Austin Automation Center or VA Office of Information will help them gain access. The tool is only available to those VA staff on the VA network.

Veteran's Integrated Service Network (VISN) number: [1-23]

VISN Chief Medical Officer (CMO): [Contact person's full name]

VISN CMO contact information: [CMO phone number]

VA internal web page tool for patient lookup located at:
<http://vaww.aac.va.gov/npcd/sav/default.php>

SIA Display Options

SIA display options allow you to set preferences. The SIA Display Options button is located in the left margin of the Sentinel Infection Alerts page. On the **DataSource** tab, settings include data sources and ICD-9 codes. This allows you to select from the full list data sources and diagnostic codes.

The screenshot shows the 'DataSource' tab of the 'SIA Display Options' dialog. It features two main list boxes: 'Date Source' on the left and 'ICD-9' on the right. The 'Date Source' list contains 'Ambulatory care diagnoses (VA)' and 'Ambulatory care diagnoses (DoD)'. The 'ICD-9' list contains a long list of codes including 'All', '005.1 - BOTULISM', '020.0 - PLAGUE, BUBONIC', '021.0 - ULCEROGLANDUL TULAREMIA', '021.3 - TULAREMIA, OCULOGLANDULAF', '020.0 - PLAGUE, BUBONIC', '020.1 - CELLULOCUTANEOUS PLAGUE', '021.0 - ULCEROGLANDUL TULAREMIA', '022.0 - CUTANEOUS ANTHRAX', '022.2 - GASTROINTESTINAL ANTHRAX', '020.3 - PRIMARY PNEUMONIC PLAGUE', and '020.4 - SECONDARY PNEUMON PLAGUE'. At the bottom are 'OK' and 'Close' buttons.

Figure 15. SIA Display Options – DataSource Tab

On the **Date Range** tab, you can set a data range for display based on Visit Date (when the patient received care) and/or the Record Received Date (when BioSense received the record).

Note: SIA preferences for a user's new session will default to all SIA records with Record Received Dates within the past five days and Event Dates within the past 30 days.

The screenshot shows the 'Date Range' tab of the 'SIA Display Options' dialog. It has two sections: 'Visit Date' and 'Record Received Date'. Each section has a 'Date Range' dropdown menu and an 'End Date' text box. For 'Visit Date', the 'Date Range' is set to '1 Month (30 Days)' and the 'End Date' is '01/30/2006'. For 'Record Received Date', the 'Date Range' is set to '5 Days' and the 'End Date' is '01/30/2006'. At the bottom are 'OK' and 'Close' buttons.

Figure 16. SIA Display Options – Date Range Tab

On the **Region** tab, you can select a Region Type (state, MRA, zip) and Region.

The screenshot shows a dialog box titled "SIA Display Options" with three tabs: "DataSource", "Date Range", and "Region". The "Region" tab is selected. Inside the dialog, there are two dropdown menus. The first is labeled "Region Type" and has "All" selected. The second is labeled "Region" and has "--N/A--" selected. At the bottom of the dialog are two buttons: "OK" and "Close".

Figure 17. SIA Display Options – Region Tab

BioWatch

BioWatch is an initiative involving deployment of environmental samplers in key locations to detect releases of certain biological agents. Collected samples are analyzed at specialized laboratories. The BioWatch section presents negative laboratory test results for these environmental samplers in three presentations: a map, a table, and a graph. The table and graph enable you to drill-down for further information.

At the top of the BioWatch home page, there is a map presentation of the MRA with color-coded zip codes based on population density. No information is currently received regarding the zip codes where collectors are located; therefore, the exact locations of the samplers are not indicated on the map.

Beneath the map, a table lists each collector ID, the collector's range of operation, the number of specimens tested, the number of confirmed signals, and the date of the last confirmed signal. The collector ID and number of confirmed signals provide drill-down capabilities. Each collector ID is a link to a table presenting a historical record of all tests for that collector, including the collection date, the external specimen ID (usually the unique ID that the EPA has assigned to filters collected from BioWatch air samplers or a lab-generated unique ID), the specimen ID (unique ID the lab assigns to a sample), the order ID, the lab test performed, the lab reporting the test results, and the positive overall findings. Filtering and column sorting options, similar to those in Health Indicators, are available.

If confirmed signals were received, there are drill-down capabilities on the number of confirmed signals on the BioWatch home page. Information presented includes collection date, external specimen ID, specimen ID, order ID, laboratory test, reporting laboratory, and positive overall findings.

At the bottom of the BioWatch home page, a histogram displays a daily count of the number of laboratory results for each day in the past two months. There is a mouse-over functionality that will produce a pop-up window indicating the date associated with the bar. There are drill-down capabilities for each bar on the graph. Each histogram bar provides a link to a table that provides all tests for that date. Filtering and sorting options are available.